

REMARKS/ARGUMENTS

The claims are 1-20. Claims 1, 2, 6, 8, 11, 14, and 20 have been amended to improve their form. Reconsideration is expressly requested.

Claims 1-20 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the reasons set forth on page 2 of the Office Action. In response, Applicant has amended claims 1, 2, 6, 8, 11, 14, and 20 to improve their form, which it is respectfully submitted overcomes the Examiner's rejection under 35 U.S.C. 112, second paragraph.

Claims 1-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over *Japanese document No. JP 11-58012*. Essentially the Examiner's position was that the Japanese reference discloses the method recited in the claims, except for specifying that

mechanical adjustment "determines the position of the welding wire," which was not considered to patentably distinguish over the Japanese reference.

This rejection is respectfully traversed.

As set forth in claim 1 as amended, Applicant's invention provides a method for controlling a welding process using a melting welding wire, wherein a welding process adjusted on the basis of several different welding parameters and controlled by at least one of a control device and a welding current source is carried out after the ignition of an electric arc. At least one mechanical adjustment process is carried out during the welding process to determine the position of the welding wire, using the welding wire as a sensor. In this way, Applicant's invention provides a method for controlling a welding process, which allows

for the determination of the position or distance of the end of the welding wire from a workpiece.

*Japanese Document JP 11-58012* shows a wire extension detection method based upon current and voltage measurement for calculation of the stick-out length of the welding wire.

In contrast, Applicant's method as recited in claim 1 as amended carries out a mechanical adjustment process during the welding process to determine the position of the welding wire using the welding wire as a sensor. The mechanical determination of the position of the welding wire largely prevents the adjustment procedure from being influenced by the welding process. Therefore, a very high accuracy is obtained. Well known methods yield only a "**relative**" result which does not allow the determination of the exact position of the end of the welding wire relative to the workpiece. Applicant's method as recited in

claim 1 as amended, has a substantial advantage in that this type of position determination can be implemented even if combinations of wire materials, gases etc. are used, with which the voltage of the electric arc does not behave proportionally to the length of the electric arc, thus rendering impossible the exact determination of the length of the electric arc by measurement or calculation. The method according to *Japanese Document No. JP 11-58012A* is based merely on the indirect measurement of the stick-out length via electrical parameters.

The mechanical adjustment process 41 according to Applicant's claim 1, as amended, is carried out during the welding process, namely for instance between two-pulse current phases 34 during pulse welding as can be seen in FIGS. 2-5 of Applicant's disclosure. The mechanical adjustment process 41 uses the welding wire 13 as a sensor. The mechanical adjustment process 41 is performed in the base current phase 35, whereby it is

ensured that no droplet 38 will form on the end of the welding wire and, hence, no or only little melting of material, or material transfer onto the workpiece 16 will occur. The mechanical adjustment process 41 moves the welding wire 13 towards the workpiece 16 in the sense of arrow 29 until contacting the workpiece 16. At that contacting of the welding wire 13 with the workpiece 16, a deliberately controlled short circuit is thus formed, which is recognized by the control device 4, with the elimination of the short circuit during the mechanical adjustment process being suppressed by the control device 4 by a current increase.

The control device 4 detects the exact position of the end of the welding wire relative to the workpiece 16, which is zero at a short circuit. From this starting position of the welding wire 13 at a short circuit the welding wire 13 is moved away from the workpiece 16 to a given distance 32, which can be effected by

effecting the rearward movement through a detection of the actual value of the welding wire using for instance an incremental sensor, so that the end of the welding wire is conveyed to a particular distance 32 by a set/actual value comparison. It is of course also possible to reach a pre-determined position or pre-determined distance 32 of the welding wire and by a simple time default for the rearward movement, because always the same position will be reached again on account of the defined conveying speed and time default. In addition, it is of course also possible to use the position of the end of the welding wire, or the course of the rearward movement, or the set distance between the workpiece 16 and the end of the welding wire, as in accordance with various other methods. It is also possible to move the welding torch to the workpiece and back again during the mechanical adjustment process 41.

The great advantage of the mechanical adjustment process 41 as recited in claim 1, as amended, is that the mechanical

adjustment process 41 is independent of the welding process. The determination of the position of the welding wire, thus, takes place independently of the used materials, gases and other welding parameters at which the voltage of the electric arc behaves nonproportionally to the length of the electric arc. In such a case, the determination of the length of the electric arc would not be feasible through electric arc voltage measurement. The Japanese document exactly describes such a method which should be prevented according to Applicant's method as recited in claim 1 as amended.

Accordingly, it is respectfully submitted that claim 1 as amended, together with claims 2-20 which depend directly or indirectly thereon, contain patentable and unobvious subject matter.

Applicant would also like to inform the Examiner that the European Patent Office will grant a European Patent on the

corresponding European patent application with a set of claims as originally filed with the foregoing international patent application.

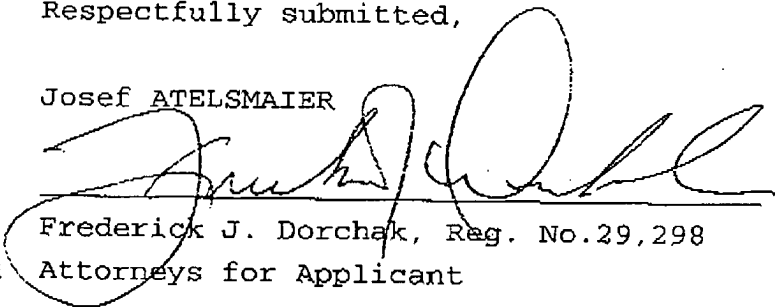
In summary, claims 1, 2, 6, 8, 11, 14, and 20 have been amended. In view of the foregoing, it is respectfully requested that the claims be allowed and that this case be passed to issue.

Respectfully submitted,

Josef ATELSMAIER

COLLARD & ROE, P.C.  
1077 Northern Boulevard  
Roslyn, New York 11576  
(516) 365-9802

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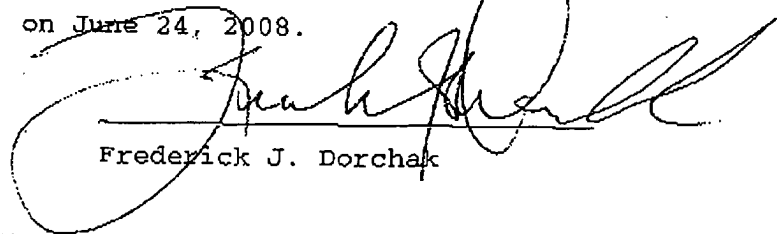


Frederick J. Dorchak, Reg. No.29,298  
Attorneys for Applicant

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Frederick J. Dorchak

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